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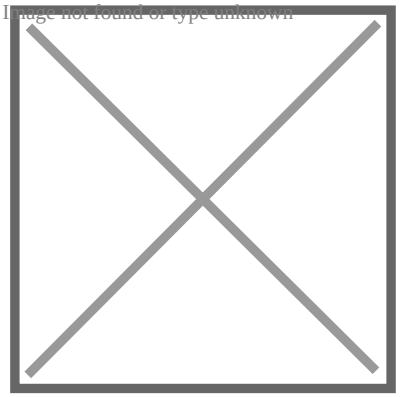


Met Office celebrates 170 years of forecasting

Description

Today, the Met Office celebrates its 170th birthday. Since its very beginnings on 1 August 1854, the organisation has been a pioneer of weather and climate science, and it is now one of the leading forecasting and research centres in the world.

We gather around 200 billion weather observations a day, generating in the region of 3,000 forecasts from our advanced atmospheric model and a supercomputer which can perform 14,000 trillion calculations per second.

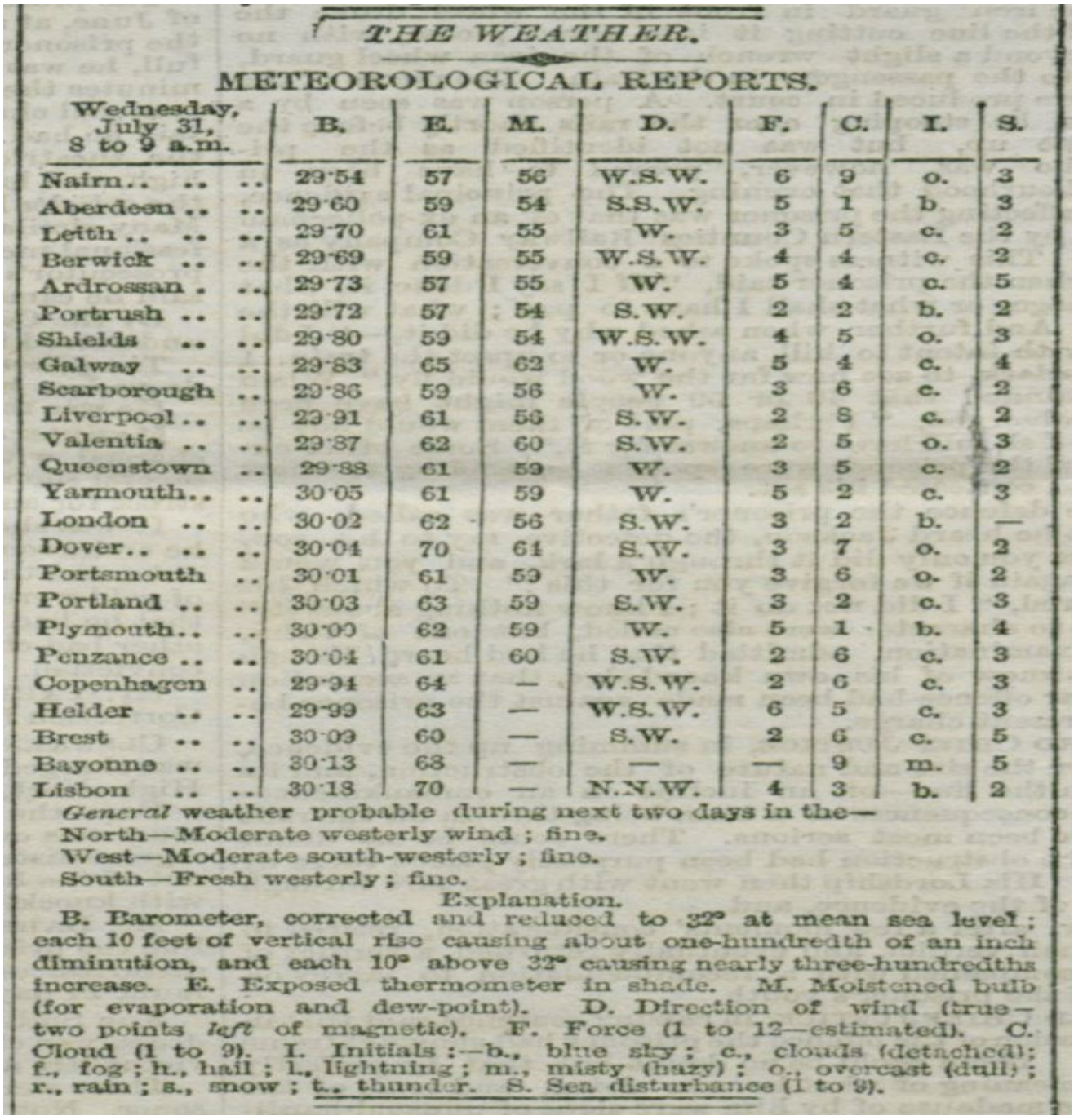
Although over the years our technical advances have been vast, our purpose is no different today than it was then;

‘**Helping you make better decisions to stay safe and thrive.**‘

On the 1 August 1854, Vice Admiral Robert FitzRoy was appointed by the Board of Trade to lead the fledgling Meteorological Office, whose purpose was to further understand the nature of the weather in the oceans, particularly the Atlantic Ocean, in order to protect life and property at sea.

FitzRoy believed we could save lives at sea by understanding weather patterns. In 1859, a violent storm wrecked the ship Royal Charter and many others, costing the lives of hundreds of people.

FitzRoy believed this kind of event could be forecast in advance – giving people the necessary time to prepare. This belief led to the launch of a national storm warning system and the writing of the first public weather forecast on 31 July 1861, which appeared in The Times newspaper.



THE WEATHER.

METEOROLOGICAL REPORTS.

Wednesday, July 31, 8 to 9 a.m.	B.	E.	M.	D.	F.	C.	I.	S.
Nairn	29·54	57	56	W.S.W.	6	9	o.	3
Aberdeen	29·60	59	54	S.S.W.	5	1	b.	3
Leith	29·70	61	55	W.	3	5	c.	2
Berwick	29·69	59	55	W.S.W.	4	4	c.	2
Ardrossan	29·73	57	55	W.	5	4	c.	5
Portrush	29·72	57	54	S.W.	2	2	b.	2
Shields	29·80	59	54	W.S.W.	4	5	o.	3
Galway	29·83	65	62	W.	5	4	c.	4
Scarborough ..	29·86	59	56	W.	3	6	c.	2
Liverpool	29·91	61	56	S.W.	2	8	c.	2
Valentia	29·87	62	60	S.W.	2	5	o.	3
Queenstown ..	29·88	61	59	W.	3	5	c.	2
Yarmouth	30·05	61	59	W.	5	2	c.	3
London	30·02	62	56	S.W.	3	2	b.	—
Dover	30·04	70	64	S.W.	3	7	o.	2
Portsmouth ..	30·01	61	59	W.	3	6	o.	2
Portland	30·03	63	59	S.W.	3	2	c.	3
Plymouth	30·00	62	59	W.	5	1	b.	4
Penzance	30·04	61	60	S.W.	2	6	c.	3
Copenhagen ..	29·94	64	—	W.S.W.	2	6	c.	3
Helder	29·99	63	—	W.S.W.	6	5	c.	3
Brest	30·09	60	—	S.W.	2	6	c.	5
Bayonne	30·13	68	—	—	—	9	m.	5
Lisbon	30·18	70	—	N.N.W.	4	3	b.	2

General weather probable during next two days in the—
North—Moderate westerly wind; fine.
West—Moderate south-westerly; fine.
South—Fresh westerly; fine.

Explanation.

B. Barometer, corrected and reduced to 32° at mean sea level; each 10 feet of vertical rise causing about one-hundredth of an inch diminution, and each 10° above 32° causing nearly three-hundredths increase. E. Exposed thermometer in shade. M. Moistened bulb (for evaporation and dew-point). D. Direction of wind (true—two points *left* of magnetic). F. Force (1 to 12—estimated). C. Cloud (1 to 9). I. Initials:—b., blue sky; c., clouds (detached); f., fog; h., hail; l., lightning; m., misty (hazy); o., overcast (dull); r., rain; s., snow; t., thunder. S. Sea disturbance (1 to 9).

[Read more about our history here]

Our impact

Since then, the Met Office has pioneered the science of meteorology and its application. Nationally, we help government, businesses, emergency responders, the public, and many others to make informed decisions.

We are the organisation behind many of the forecasts you see on TV, websites or smartphone apps, and we are responsible for the UK's National Severe Weather Warnings.

On an extreme weather day, our public website and mobile apps see around 20.6 million page views and 2.1 terabytes of data downloaded.

Our forecasting has supported British and allied defence operations worldwide for more than 100 years. From our crucial D-Day landings forecast, to our Mobile Met Unit today, who continue to support the armed forces wherever they are in the world.

Every day our impact can be seen on a regional, national and international scale. Our forecasts:

- keep airlines flying safely
- our roads flowing freely
- our railway lines working efficiently
- help our utilities companies keep the power on

Exceptional science and ground-breaking research

We're also advancing global understanding of our changing climate through ground-breaking research that underpins critical services vital for UK resilience, supporting communities, industry and government to better prepare for future climate risk.

Through the work of the Hadley Centre Climate Programme and our UK Climate Projections analysis tool, we provide authoritative scientific advice to government and customers on climate. We employ more than 500 scientists, who have had over 6,000 peer-reviewed papers published since 1981.

The Met Office has contributed to all six IPCC Assessment Reports and through our consultancy services, our experts give crucial advice and support that leads to effective action being taken when it matters.

Looking further ahead, our investment in data science, machine learning and artificial intelligence will help us meet the challenges of the future.

Met Office Chief Executive Professor Penny Endersby said in an interview with Civil Service World magazine:

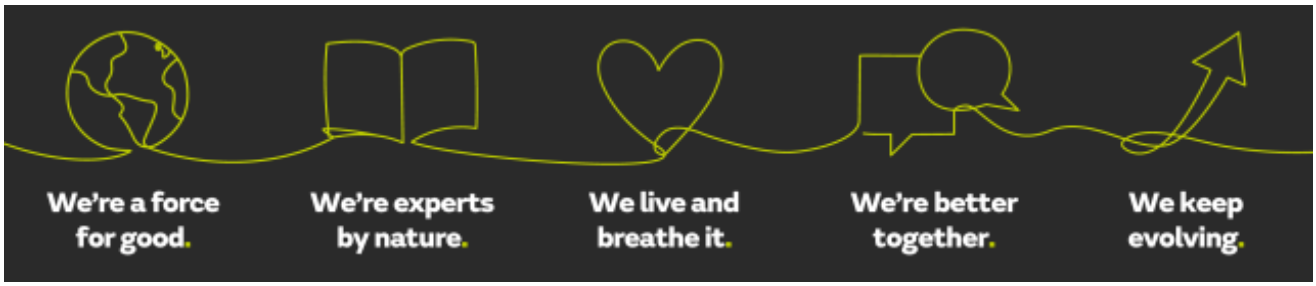
“I am proud every day of the difference we make to the lives of people in the UK and across the globe and the contribution we make to ensuring that the challenges from a changing climate are understood, and the world is as prepared as possible to limit warming and adapt to the changes which are already inevitable.”

Read the full interview with Professor Penny Endersby.

If you’d like to find out more about our history, check out our National Meteorological Archive and our Digital Library and Archive, which includes digital copies of some of our unique and fascinating archive treasures.

Take a look at our Google Arts and Culture project page that brings to life highlights from the National Meteorological Archive alongside the current work of the Met Office in a series of digital stories.

You can get an accurate weather forecast by using our mobile app, which is available for iPhone from the App store and for Android from the Google Play store, by using our forecast pages and by following us on Twitter and Facebook.



Date Created
August 2024

Contrasting conditions in a cool and dull July

Description

Contrasting conditions in July, with some cooler than average temperatures, rain, cloud and even a heatwave, combined to make July 2024’s weather statistics close to average for the UK.

Cooler than average temperatures

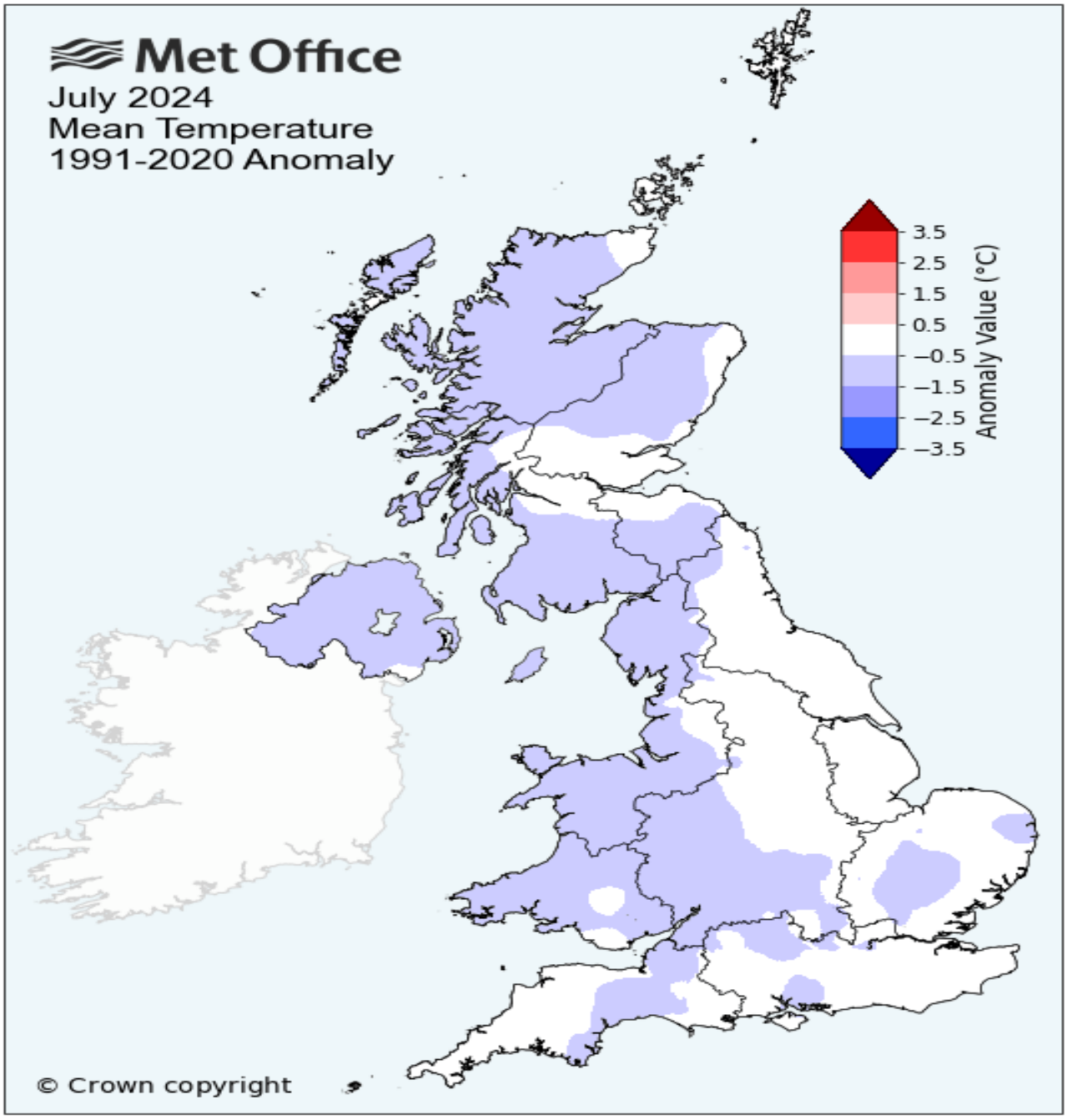
Provisional Met Office statistics show that July was cooler than average in the UK and across all four countries. The average mean UK temperature was 14.8°C. This is 0.5°C below the latest 1991-2020 long-term meteorological average for the month.

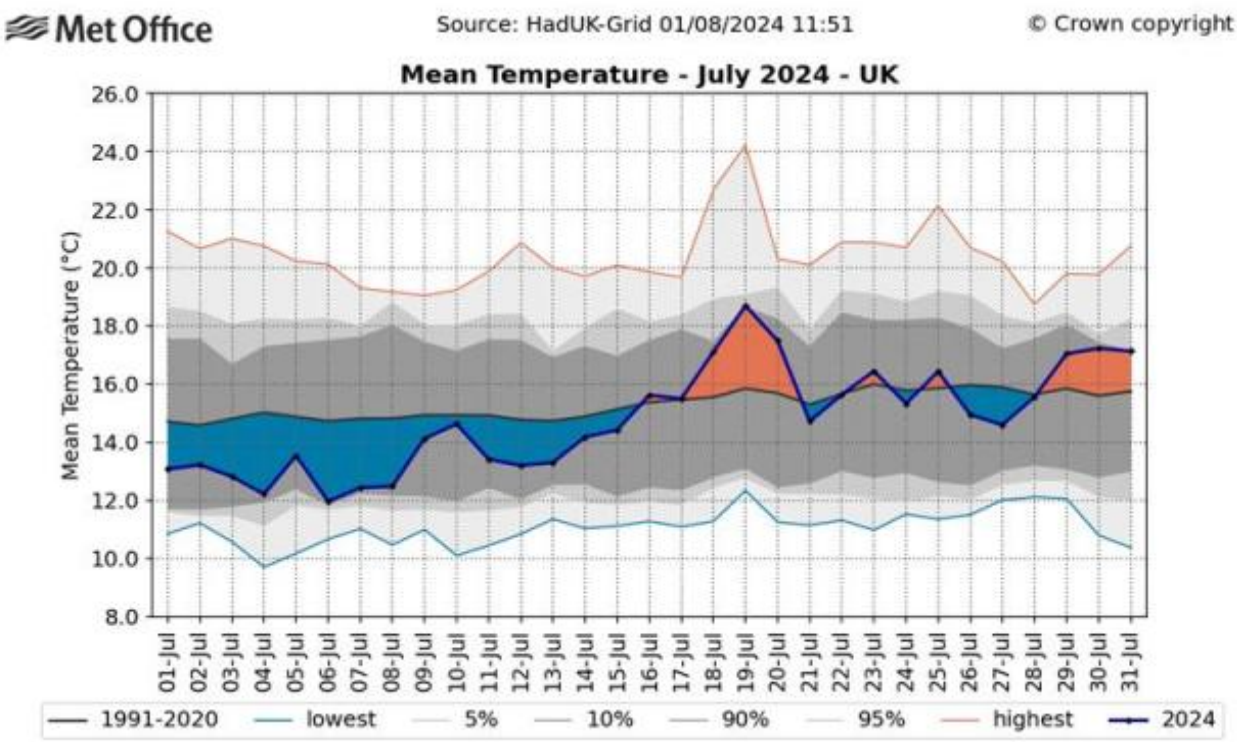
Temperatures were persistently below average across the UK for the first two weeks and by the 15th of July, the mean temperature was 2.0°C below average in what was provisionally the coldest start to July since 2004. The monthly mean temperature is calculated from daily maximum and minimum temperatures obtained from a network of observational stations across the UK.

Temperatures increased in the third week briefly, before low pressure brought more unsettled weather. The last week of the month saw high pressure in charge, with the highest temperature of the year so far recorded on 30th of July with 32°C at Kew Gardens and Heathrow.

This will be the third spell in which we have reached over 30°C this year, with the other occasions being in late June and mid-July. However, all spells of summer warmth so far have tended to be brief.

Interestingly, July 2024’s average mean temperature of 14.8°C is considered warmer than average when compared to the 1961-1990 meteorological averaging period for July. The long-term average July mean temperature for that period was 14.4°C, compared to the 1991-2020 long-term average of 15.3°C, which demonstrates the warming trend the UK is experiencing as a result of human induced climate change.

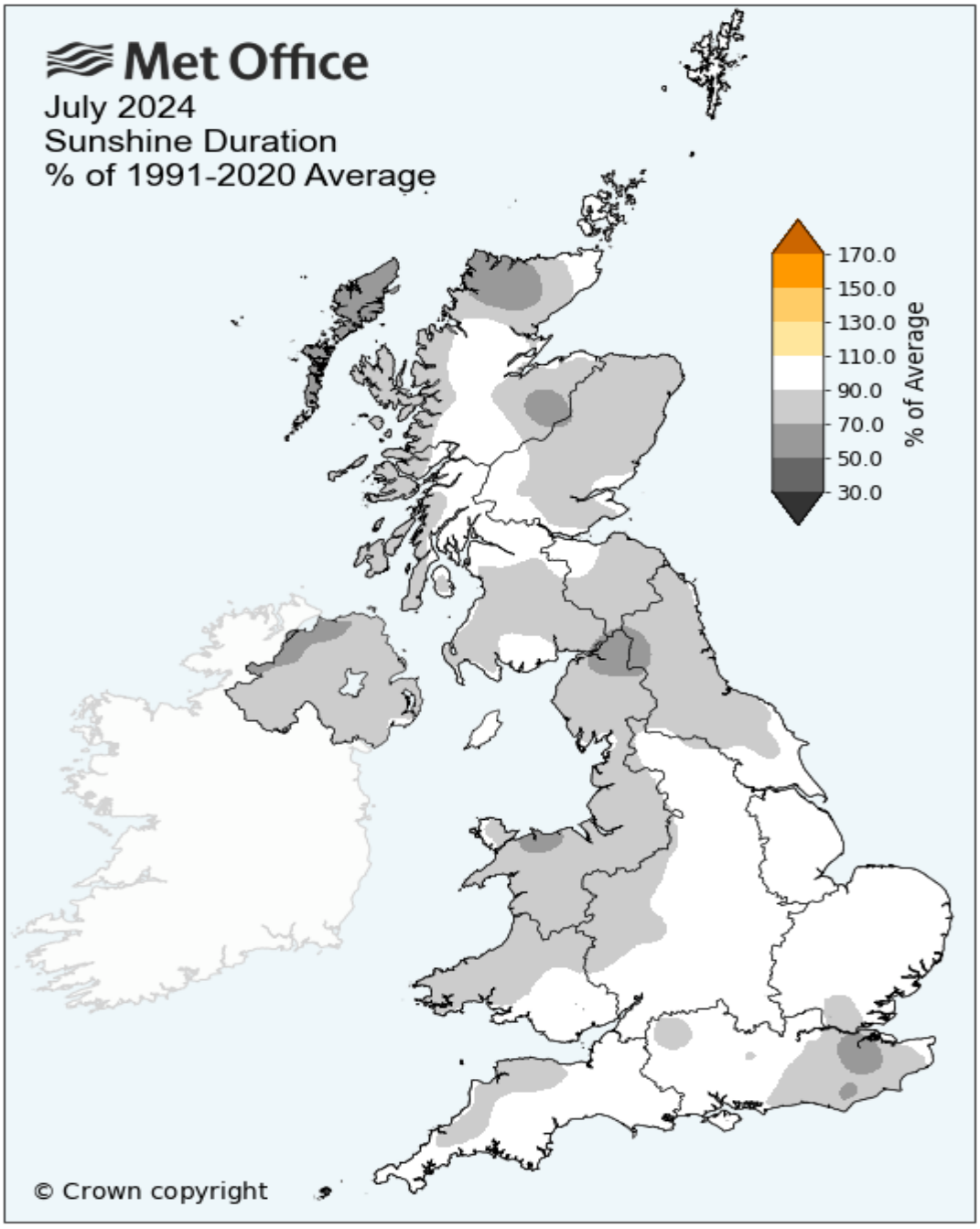

Met Office
July 2024
Mean Temperature
1991-2020 Anomaly
3.5
2.5
1.5
0.5
−0.5
−1.5
−2.5
−3.5
Anomaly Value (°C)
© Crown copyright



This graph shows the daily mean temperature for July 2024, plotted against the long-term meteorological average (1991-2020).

Below average sunshine for many

Sunshine hours for the UK were below average, with 153.7 hours of sunshine (11% less than the long-term meteorological average). Neither England, Ireland, Scotland or Wales reached their average monthly sunshine this month.



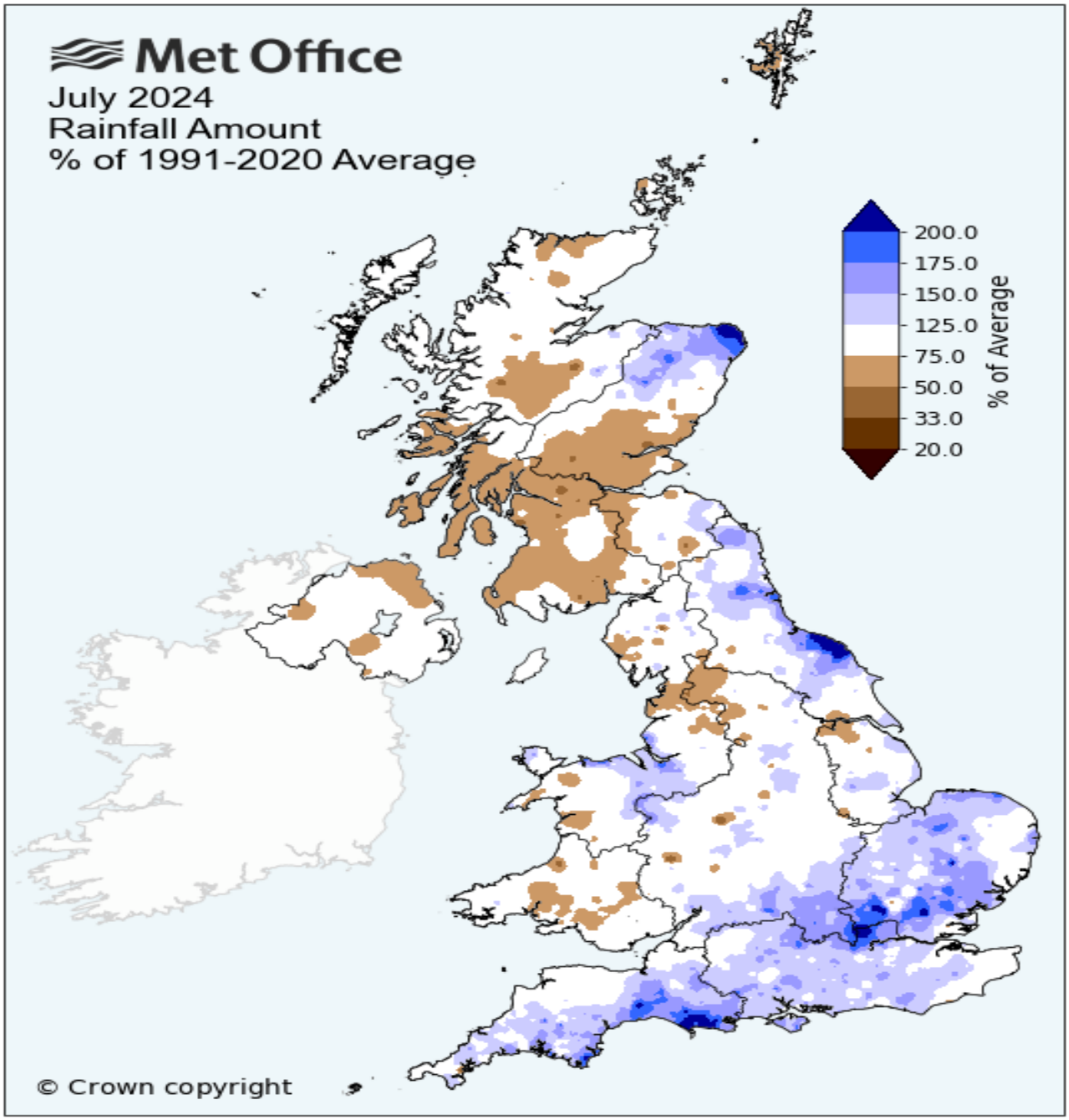
Average rainfall for the UK but wet for some

While there was much regional variation, the UK provisionally experienced around average rainfall.

The UK recorded 82.4mm which is the long-term meteorological average. England, however, saw 19% more rainfall than its average, recording 79.0mm. Scotland, Wales and Northern Ireland were all slightly drier than average.

Met Office scientist Emily Carlisle explained: “The start of July continued June’s theme of cooler than average weather, but with the addition of more wet conditions.

“Low pressure across the UK led to unsettled weather at the beginning of the month and several frontal systems brought bands of rain. Areas of southwest, southeast and northeast England had already received more than the average July rainfall by the 15th.”



Summer so far

Meteorological summer in the UK so far (June and July combined) has recorded below average mean temperatures, rainfall and around average sunshine hours.

Statistics can change quite quickly in a UK summer and there’s still plenty of time for shifts in the

figures.

A comprehensive review of the UK climate and significant weather events through 2023 was published last week. Read the State of the UK Climate report here.

Provisional July 2024	Mean temp (°C)		Sunshine (hours)		Rainfall (mm)	
	Actual	Diff from avg (°C)	Actual	% of avg	Actual	% of avg
UK	14.8	-0.5	153.7	89	82.4	100
England	16.0	-0.4	179.7	92	79.0	119
Wales	14.6	-0.7	150.8	85	88.7	90
Scotland	12.8	-0.6	119.2	85	87.3	84
N Ireland	14.0	-0.6	105.9	78	77.0	86

Date Created
August 2024

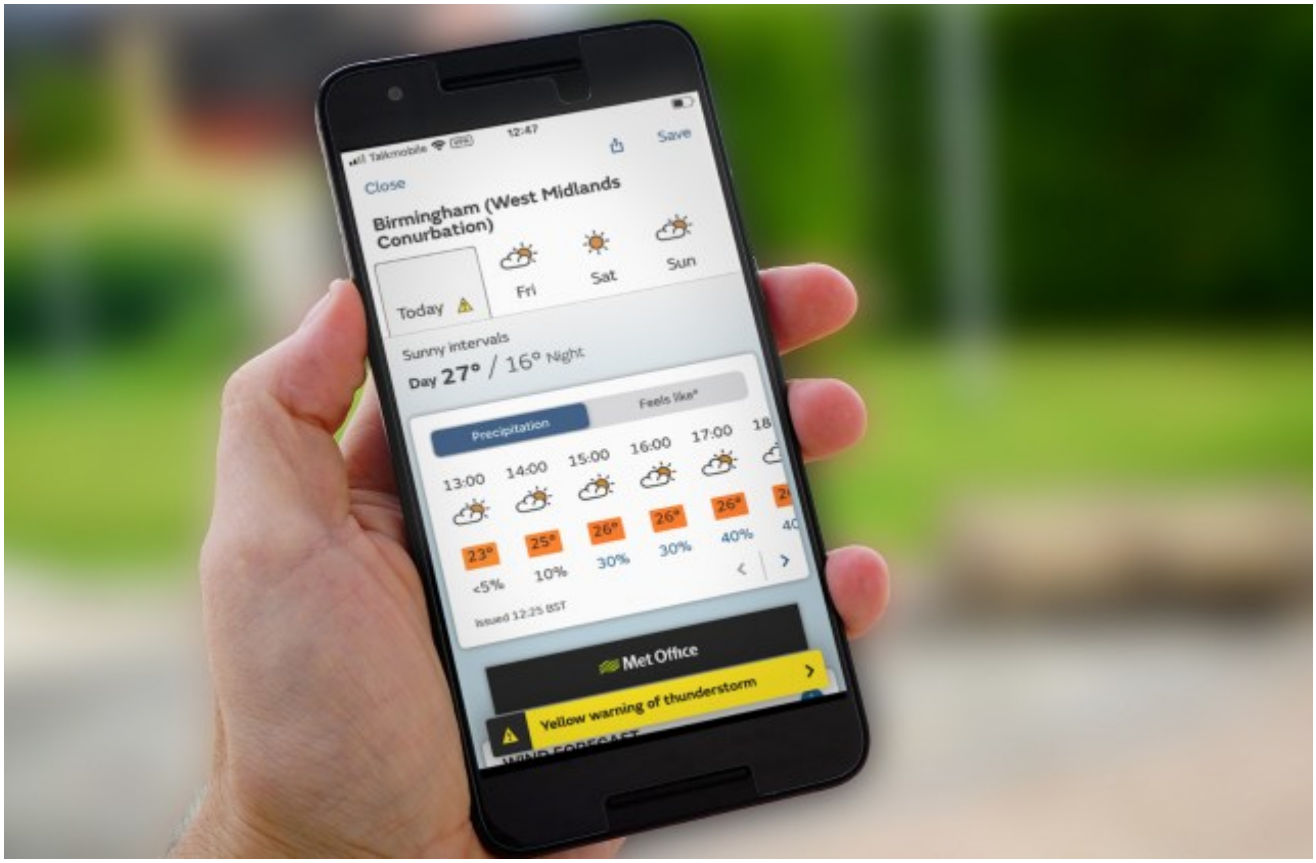
Better weather forecasts on Met Office website and app

Description

We have made major changes to the weather forecasts on our website and app. Although you may not have noticed anything different yet, we've undertaken a significant upgrade to the data system that generates our seven-day forecasts throughout the UK and around the world.

The innovative new system gives more precise and up-to-date weather information, from one hour to seven days ahead, by combining weather outputs from the latest high-resolution models with ensembles, where data models are run multiple times to present the range of future weather possibilities.

Find out more about ensemble forecasts



The new data appears in the forecast tables on our website and app .

Simon Vosper, Executive Director of Science at the Met Office, said: "Although most people won't 'see' anything different, what's going on behind the scenes is really exciting.

"Our new post-processing system capitalises on our ensemble forecasting capability, which captures the range of possible further weather events, allowing us to better estimate the likelihood of severe

weather. It exploits our latest high-resolution models, resulting in more accurate temperature forecasts, more accurate predictions of rain, hail and snow, and more accurate weather symbols.

“It’s taken big scientific investment to get to this stage, so it’s an important milestone for the Met Office, and there are more exciting developments to come. We’re now looking to improve our forecasts further, exploring ways to provide additional weather information relating to temperature and rainfall on our website and app.

“Everything we do here at the Met Office is to provide our users with accurate and up-to-date weather information so that they can make better decisions, whether that be simply choosing between going to the beach or an indoor leisure centre during the summer holidays, or even deciding if it’s a good idea and safe, to do what they’ve planned.”

More accurate weather information

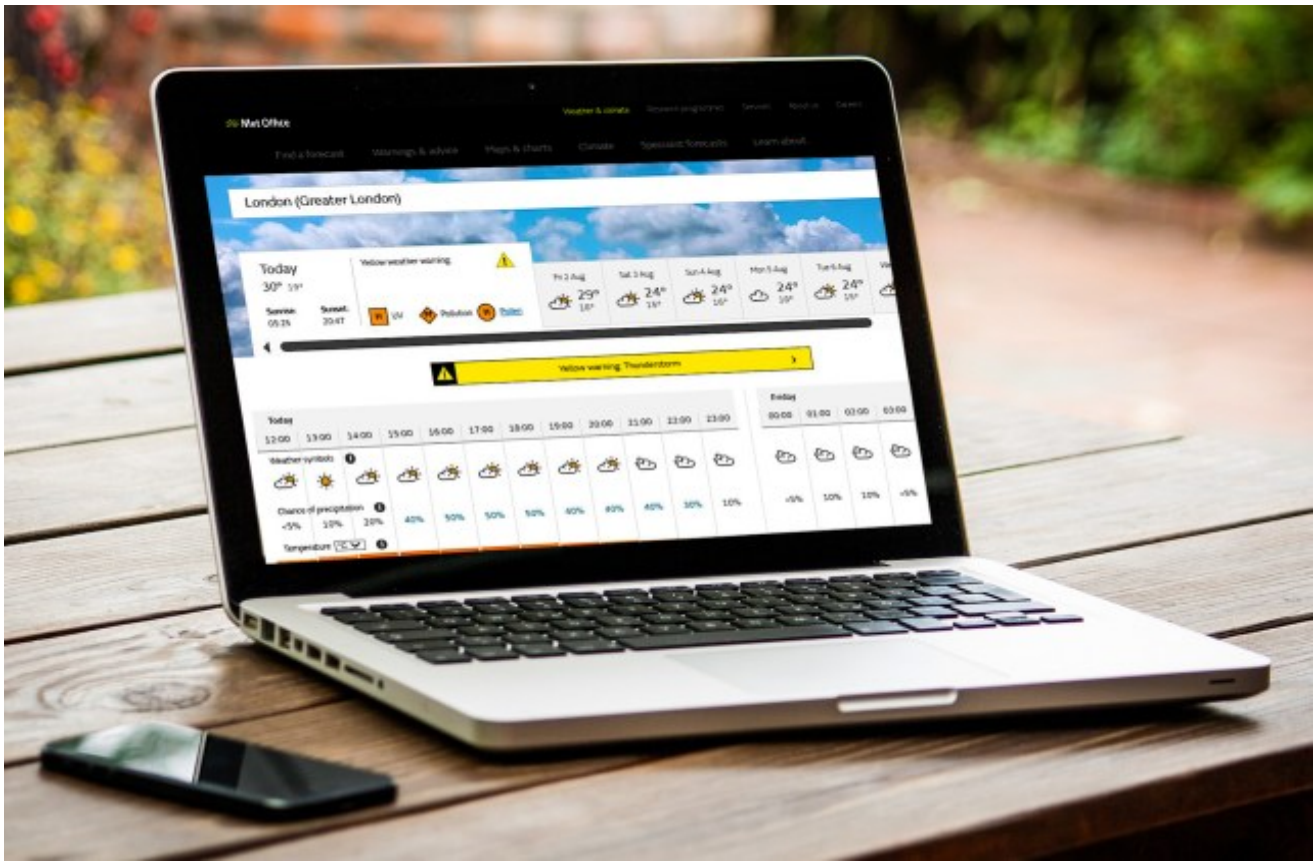
The new data is displayed in the forecast tables on the website and app. It provides many users with the following benefits:

- more accurate temperature forecasts
- more accurate predictions of rain, hail and snow
- more accurate weather symbols

Although the data is new, we haven’t changed the visual appearance of our forecasts.

Extensive testing of new data

We tested the new data with our users. Those who took part in a public trial earlier this year told us the new data was more accurate overall than the previous data.



Get our new forecasts by visiting our website or downloading our app.

You can join our group of app testers to get new features and updates before they are released to all users.

You can also give us your feedback so we can continue to improve our forecasts.

Date Created
August 2024

‘Significant’ impacts from Tropical Storm Debby in United States – will it influence UK weather?

Description

Tropical Storm Debby – which made landfall in northern Florida on Monday as a hurricane – will continue to impact eastern and southeastern parts of the United States in the coming days.

Debby will slowly drift north through the remainder this week, drawing in moist air from the Atlantic. Having already dropped up to 400mm rain over parts of Florida, it will produce incredibly high rainfall amounts for parts of Georgia and North and South Carolina.

Julian Heming is a tropical cyclone expert at the Met Office and has been tracking Debby’s progress. He said: “Tropical Storm Debby is likely to bring significant impacts to eastern parts of the United States. Moist air from the subtropical Atlantic is being drawn northwards by the storm and current forecasts suggest 200-400mm of rain will fall quite widely in the area, with parts of the Carolinas possibly seeing as much as 600mm of rain in the coming 3-5 days.

“Average annual rainfall at Charleston, South Carolina is around 1200-1300mm, so this means this region could see six months’ worth of rain fall within a few days.

“While confidence in the track of Debby decreases later in the week, the remnants of the storm are most likely to continue northwards on the eastern side of the United States, bringing a chance of continued heavy rain for the Eastern Seaboard over the weekend.”

Will Tropical Storm Debby affect the UK’s weather?

Tropical Storm Debby itself is likely to weaken and gradually break up later in the week and into the start of next week as its remnants continue to influence the weather in the far northeast of the United States and the far southeast of Canada.

While the storm itself won’t impact the UK, the influence of Debby does play a role in the UK’s medium-range forecast.

While this week’s weather continues a fairly changeable pattern, with influxes of rain from the west and northwest in the coming days, Debby’s influence on the UK’s weather is likely to be more of a background influence next from Sunday onwards, rather than directly impacting the UK.

Met Office Deputy Chief Meteorologist Nick Silkstone explained: “While Debby itself won’t reach the UK, the system and its remnants does play a role in the UK forecast next week, but chiefly as background influence on the shape and strength of the jet stream, which often plays a significant role in the weather we experience in the UK.

“Debby in North America will help to strengthen and veer the direction of the jet stream and this means

this ribbon of air is likely to shift further to the south."

"This southwards dip in the jet stream will likely be located across the mid-Atlantic this weekend and early next week, allowing southwesterly flow across the UK. During this time a hot and perhaps very hot airmass could develop and be advected into the southeast of the UK. On balance it now looks likely that temperatures will reach 30°C, with around a 30% chance that temperatures could reach the mid-30s Celsius early next week. Debby plays a role in developing this forecast hot spell."

Even during this time though, the northern extent of the hot airmass, most likely across central or northern parts of the UK will likely see periods of heavy rainfall moving northeast, and within the hot airmass there is a chance of some severe thunderstorms breaking out.

Towards the middle of next week there's plenty of uncertainty, but it is most probable that the dip in the jet stream will continue east, placing the UK on to the colder side of the jet. This would see the hot airmass become displaced, and eventually bring cooler and more changeable conditions. It could be unseasonably windy at times in some west and northwestern areas.

You can find the latest forecast on our website, on YouTube by following us, on Twitter and Facebook , as well as on our mobile app which is available for iPhone from the App store and for Android from the Google Play store.

Date Created
August 2024

Assembling our capability for ensemble weather forecasting

Description

The real world is neither black, nor white. It is made from shades of grey. The weather forecast can contain many possibilities, but forecasters usually try to distil it down to the most likely outcome. Why should a weather forecast try to determine a single ‘black’ or ‘white’ outcome, rather than present a more well-rounded picture of all of the shades of the weather that could possibly come?

Up to now, traditional weather forecasting has tended to rely upon determining a single (most likely or deterministic) solution; discarding many other potentially useful possibilities in the process. This method has been based on what forecasters can best provide, rather than necessarily what users of the forecast may actually need.

But times are changing. We will soon be giving customers the forecast that best suits their needs by using more of the available information to create more accurate and a more useful forecast that enables better decisions to be made. Providing different possibilities for the weather forecast uses a method known as ensemble forecasting.

Some decisions could be mistakenly regarded as simple, not requiring too much detailed weather forecast information. Ken Mylne is an ensemble forecasting expert. He said: “Even a simple decision like ‘should I take an umbrella tomorrow’ will depend on how much you’re concerned about getting wet.

“If you are dressed up for an important event then any likelihood of rain is sufficient to encourage you to take an umbrella, but if you were dressed casually for a walk with the dog you may have fewer concerns about getting a little wet.”

But what about an energy company concerned about whether strong winds will trigger power outages? Here lots of decisions need to be made. Should more engineers be put on standby to cope with power outages? Should generators be available to provide energy in certain locations? Should vulnerable customers be warned? All of these actions can have hefty cost implications, so being able to assess the risk ahead of making those decisions provides greater confidence.

Customer benefit

These are cases where the customer would benefit from having access to much more of the information to make informed decisions, rather than relying on the conventional ‘black’ or ‘white’ outcome. For example, knowing the chance of wind speeds approaching the tolerance of power cables to withstand them will allow more balanced decisions to be made. Some customers find it vital to know if there is only a small chance of significant impacts.

Ken Mylne concluded: “We believe the greatest value of ensembles will be realised with so called HILL events – these are weather events which although deemed to be low likelihood can have extremely high impacts. These events can include windstorms, thunderstorms, snowfall and intense rainfall.

“That is why we are moving away from the single ‘deterministic’ outcome to a process called ensemble forecasting, where many forecasts are produced to see not only the most likely outcome but also to assess the risk of otherwise unlikely events causing considerable impacts. We will still be providing simple forecasts for those customers who don’t need more detailed information, but for those who do our forecasts will reflect their needs.”

Date Created
August 2024

20 years on from Boscastle – how would things be different?

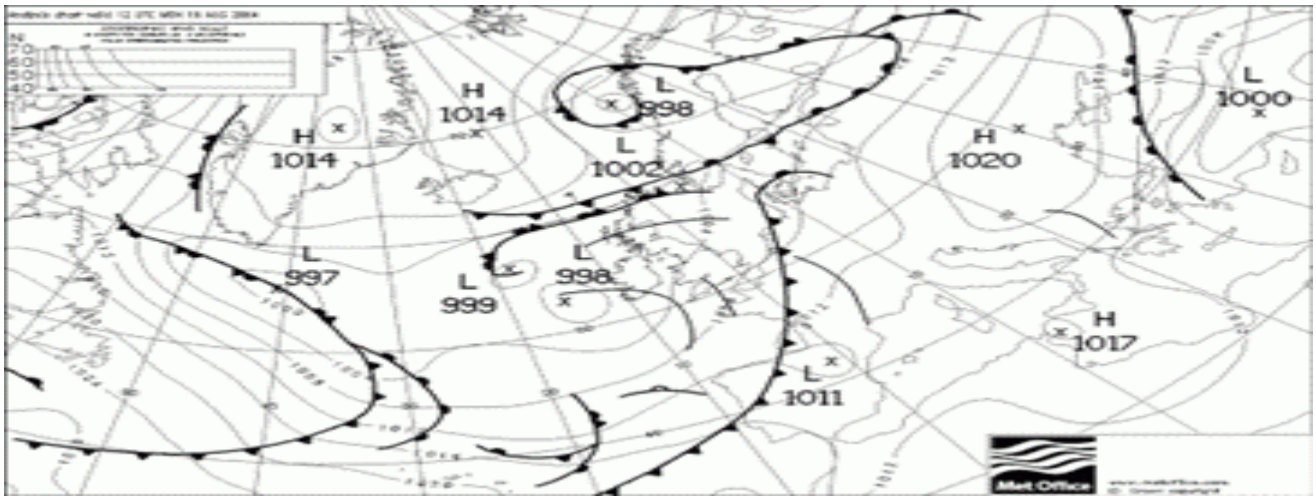
Description

It's now 20 years since a devastating flood swept through the small Cornish village of Boscastle. A month's worth of rain fell in just two hours, causing two rivers to burst their banks and about two billion litres of water to rush straight into the village. Whilst rainfall was in the forecast that day, the intensity of that rainfall and its impact on the village was not predicted, meaning residents had little time to react.

But would things be different if this happened today? The Met Office's Professor Brian Golding says we would be 'much better prepared today' than we were in 2004.

Why did it happen?

On the 16 August 2004, an upper trough associated with an area of low pressure to the southwest of the UK led to intense thunderstorms developing along a stationary sea-breeze front over the moors to the east of Boscastle, which saw more than 200mm of rain fall in just five hours.



Synoptic chart for midday 16 August 2004

What were the impacts?

Many properties were destroyed, the church was filled with six feet of mud and water, cars, walls and bridges were swept away. A massive helicopter aided rescue operation was launched by HM Coastguard and the military, which saw residents being airlifted from trees and rooftops. Thankfully there were no fatalities.

Read more about the Boscastle event.

Picture from The Environment Agency

What if it happened now?

We have seen many advancements in meteorological understanding, forecasting capabilities and working practices since 2004, which have improved the way that severe weather and its impacts are forecast and subsequently managed.

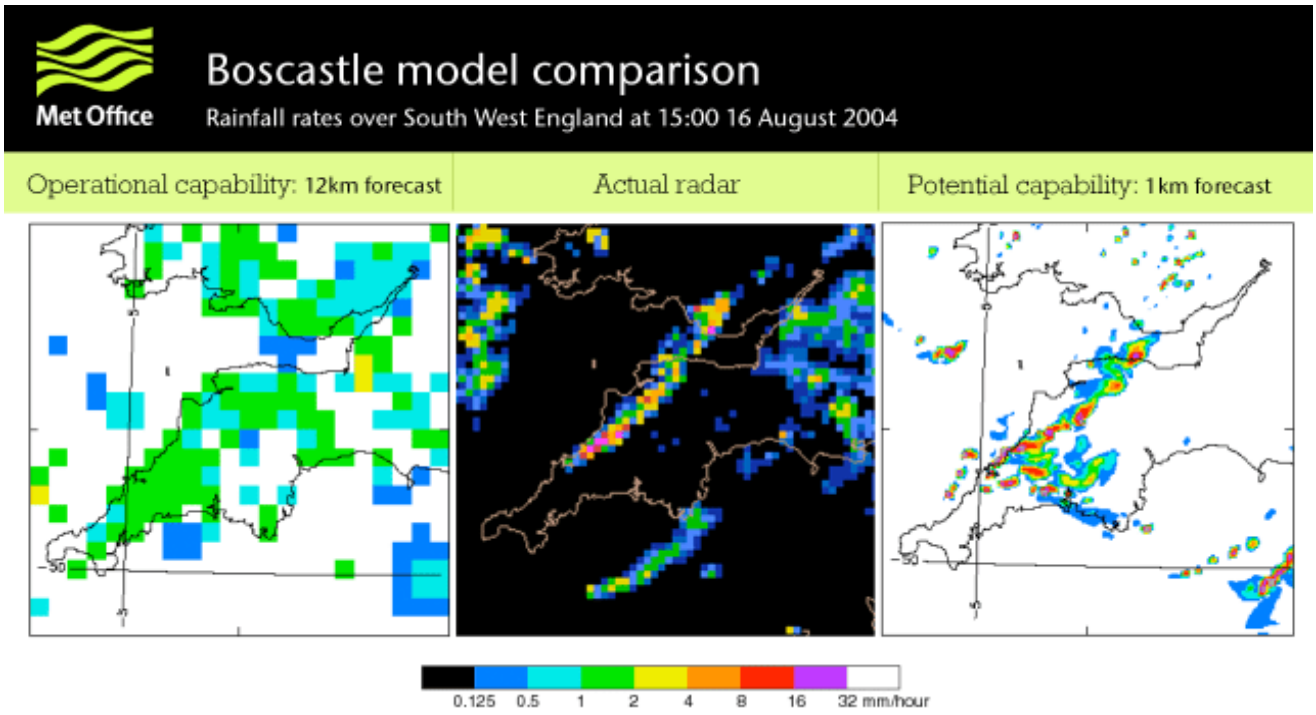
Improved forecasting capabilities

We've made significant improvements in our forecasting capability, with better predictions of the conditions that lead to such downpours and much more precise model data, enhancing our ability to predict and respond to extreme weather events.

- **Higher resolution models**

Back in 2004, the operational forecast model had a resolution of 12 km. This means the grid squares on the model measure 12km by 12km. As you can see from the radar image on the left, these large grid squares were able to point out a weak signal of light rain across most of the Southwest Peninsula, but they weren't able to capture such a small-scale line of thunderstorms and thus, forecasters could not predict just how intense they were going to be on such a small area.

Today though, our operational models are much more detailed. As seen on the right, higher resolution models (1km by 1km) are able to show the line of thunderstorms with much more accuracy and detail.


Met Office
Boscastle model comparison
Rainfall rates over South West England at 15:00 16 August 2004
Operational capability: 12km forecast
Actual radar
Potential capability: 1km forecast
0.125 0.5 1 2 4 8 16 32 mm/hour

Met Office meteorologist Alex Burkill explains: “If Boscastle were to happen today and we used our current high-resolution forecast, you can see that it much better captures the intense rain that lingered parallel to the north Cornwall coast.

“You can see that the model shows the development of thunderstorms with much more representative intensity and location, which was very similar to the radar data from the actual time as shown in the middle.

“Had we had higher-resolution models back in 2004, we would have been able to pick out such a small-scale extreme weather event with a longer lead time, allowing us to provide advance warning and advice.”

Find out more about forecast models.

- **A move to ensemble forecasting**

A further improvement to our forecasting has been the move to what’s called ‘ensemble’ forecasting. This is where instead of running just a single forecast, the computer model is run a number of times from slightly different starting conditions. The complete set of forecasts is referred to as the ‘ensemble’, and gives the forecaster a much better idea of how the weather might develop.

In the case of Boscastle, if ensemble forecasting had been an option, forecasters would have been able to compare differing forecasts and therefore be able assess their likelihood, warning communities of the risk of extreme weather.

Find out more about ensemble forecasting.

- **Website and app improvements**

Although our website was operational in 2004, our forecast app was not launched until much later in 2016. Since then, we have made many improvements to the forecasts we provide, giving more precise and up-to-date weather information, including severe weather warnings straight to people's mobiles.

We've recently undertaken a significant upgrade to the data system that generates our seven-day forecasts throughout the UK and around the world for example.

- **New nowcasting tools**

Another, more recent initiative is a technique known as 'nowcasting'. Nowcasts are short-range observations-based forecasts valid for periods of up to six hours.

Professor Brian Golding explains: "The nowcasting initiative has produced several tools that support early (one hour ahead) recognition of the potential for extreme local rainfall. So, if we had a team working on nowcasting at the time of Boscastle, we'd have been able to quickly produce detailed guidance on the location, extent and timing of the imminent, high impact weather. This sort of information is critical for emergency responders as they work to protect lives and properties in local communities."

Learn more about Nowcasting

Substantial flood management investment

Flood management has improved immensely since 2004, with the Environment Agency investing more than £10 million in improving flood defences in Boscastle.

Less visible, but incredibly important, was the opening of the Flood Forecasting Centre (FFC) in 2009 following recommendations made in the Pitt Review.

A partnership between the Met Office and the Environment Agency, the FFC combines meteorology and hydrology expertise to forecast for river, tidal and coastal flooding, as well as flash flooding from extreme rainfall. The team is operational 24/7 and plays a key role in the provision of earlier and more accurate warnings of flood risk, supporting Government, local resilience communities and category 1 and 2 responders to keep the public safe.

Ben Johnstone, Environment Agency Flood and Coastal Risk Manager for Devon, Cornwall and Isles of Scilly, said: "Building on the lessons learned from Boscastle, our close work with the Met Office has led to significant advancements in flood monitoring, forecasting and warning services. The opening of the Flood Forecasting Centre has been fundamental to our collaboration, allowing us to predict extreme weather with greater accuracy, issue more precise and timely flood warnings and respond more swiftly and effectively when needed. We will continue this close partnership, to keep innovating to help communities become more flood resilient.

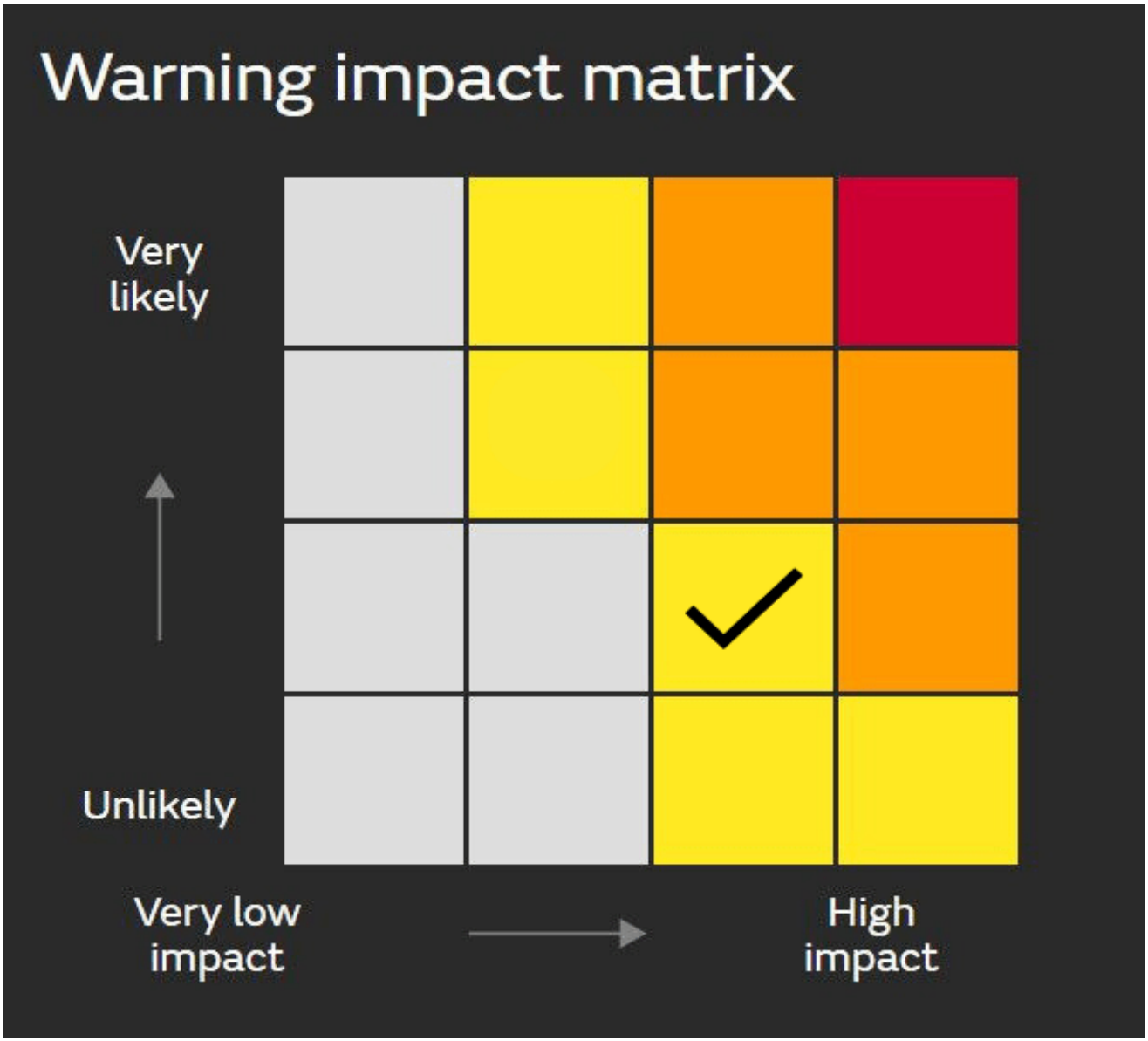
"We can never eliminate flooding entirely and, due to our changing climate, we can expect more intense rainfall all year round. We encourage everyone to sign up for free flood warnings as a vital way of staying informed and protecting yourself and loved ones."

Picture from The Environment Agency

Changes in the way severe weather is communicated

Our National Severe Weather Warning Service – which warns of potential impacts caused by severe weather – has been updated and is now based on a combination of the level of impacts the weather may cause, and the likelihood of those impacts occurring. The warnings now give the public and emergency responders more focused and useable advice, helping them prepare or take action earlier.

The Met Office continues to invest in new ways of predicting heavy rainfall events on a small scale to produce better warnings.



Our National Severe Weather Warning Service matrix

On the ground, we have set up a network of Met Office Advisors (Civil Contingencies) who ensure that local resilience teams are aware of the development of potentially severe weather and what the impacts might be so that they can plan and prepare.

A huge change in the past two decades, has been in communications. 20 years ago, people mainly got their weather forecasts through the radio and television. If they missed the forecast in the morning, it's quite likely they wouldn't hear another until lunchtime or the evening. But today, we are constantly in communication, and we can reach people far more easily.

If we need to communicate extreme weather, we can reach our 2.4 million followers on social media in an instant. Warnings would be seen by the 6.3 million people who have the Met Office App and on an extreme weather day, our public website and mobile apps see 20.6 million page views and 2.1 terabytes of data downloaded.

The next 20 years

As we saw in the dramatic European floods of 2021 where more than 200 people were killed, extreme convective rainfall can still catch us out, even if well forecast days in advance.

With higher maximum daily temperatures and more intense rainfall affecting the UK because of climate change, the impacts of flooding are likely to be greater in the coming decades. Ongoing research and technology development are therefore crucial.

Our new supercomputer will ultimately be six times more powerful than the current machine, enabling further developments in ground-breaking weather and climate change modelling.

Artificial Intelligence (AI) is also opening-up new ways to forecast better. Last year, we announced a ground breaking partnership with the Turing Institute to develop AI models for improved forecasting. Chief Meteorologist Steve Ramsdale explains:

“For high impact weather events such as Boscastle, AI could be utilised at multiple forecast timescales, such as recognising the potential for severe weather at longer lead times up to very short term, highly localised nowcasts, combining traditional and novel observational datasets with high powered numerical weather prediction models.

“The challenge now is bringing together these diverse datasets in an effective and interpretable manner whilst maintaining human intuition and insight into, along with oversight of, the resulting output ensuring accurate and trustworthy information flows out of the Met Office, fulfilling our core purpose of helping us all make better decisions to stay safe and thrive.”

And this is just the tip of the iceberg for the future of this transformative technology. Our scientists are involved in pioneering research, such as this new study led by the Met Office, which uses machine learning to improve hyper-local forecasts for heatwaves in urban areas.

Professor Simon Vosper, Executive Director of Science at the Met Office, said: “Our forecasting capabilities are constantly developing and improving thanks to world leading, cutting-edge science and technology and although the conditions that led to the Bocastle floods will undoubtedly happen again, we are much better prepared two decades on.

“We have earned a reputation for continually pushing the boundaries of scientific, technological and operational expertise, and we will continue to do so, so that we can meet the demands of today and the future.”

Date Created
August 2024

Nasa Space Apps Challenge returns to Exeter

Description

The Met Office will play its part in the world's largest hackathon when it hosts NASA's International Space Apps Challenge once again.

Up to 150 participants will gather for the two-day event at the Met Office headquarters in Exeter on 5-6 October to take on challenges set by NASA on the theme of 'the Sun touches everything'.

The Joint Centre for Excellence in Environmental Intelligence (JCEEI), which is a partnership between the Met Office and the University of Exeter, and TechExeter are running the annual event, being held at the Met Office for the 11th time.

The Transatlantic Data Science Academy and Amazon Web Services are providing additional sponsorship.

Registration is open now, with people of all ages, skill levels and backgrounds welcome to attend. Attendees may include tech enthusiasts, college and university students, business professionals, artists and creative thinkers.

Teams will use diverse skills to take-on the challenges on topics ranging from storytelling to software

development, astrophysics, space exploration and more.

Attendees will be able to connect with fellow participants, learn new programs, gain knowledge, and explore innovative approaches to new and existing problems using NASA’s data.

The Met Office event is free to attend, and participants will be given free meals, snacks and drinks throughout the weekend. Free childcare is also available on-site for those who want to attend with young children.

At the end of the weekend, a panel of judges will choose their winners to be put forward for the global prize.

Kris Sum, TechExeter community leader, said: “Space Apps is perfect for anyone with a curious mind who wants to take on innovative challenges.

“Don’t let the ‘apps’ part put you off coming. It’s all about meeting new people and trying to solve some of the world’s biggest problems together. The best teams are often the most diverse teams in terms of age, skills and experience.

“Last year we had poets, film makers, teachers, students, and more working together. We’ve seen people make video games, space suits, mars habitats, phone apps, movies and songs. And some teams have made great projects entirely from cardboard!”

Dr Rachel McInnes, the JCEEI’s Co-Director from the Met Office, said: “We’re thrilled to be hosting the Space Apps challenge again, and playing our part in the largest hackathon on Earth. This is about

bringing exciting science into the community and opening our doors to a wide range of people.

“Space Apps is for anyone with a curious and creative mind who fancies taking on NASA’s innovative challenges. We’re hoping to get a diverse range of people who solve problems in different ways.

“I’m so proud we’re offering free childcare by popular demand to make this free event as inclusive as possible.”

Prof Hywel Williams, JCEEI Co-Director from the University of Exeter, said: “Space Apps will allow teams to explore some fascinating topics together, and I’m sure will be a lot of fun for everyone involved. It’s a fantastic opportunity for the community to get close to the exciting science being developed at NASA, the Met Office and the University of Exeter.”

Despite being known for its weather and climate services on Earth, the Met Office has its own Space Weather Operations Centre, which is one of a handful of 24/7 space weather forecasting centres in the world. The Space weather centre monitors the Sun’s activity for the safety of satellites, astronauts and people on Earth.

The NASA International Space Apps Challenge 2023 welcomed a record 57,999 registered participants at 402 local events in 152 countries.

You can register now for the event taking place at the Met Office in Exeter on 5-6 October. Registration closes on Monday 23 September.

Date Created
August 2024

Looking back on a storm-laden season

Description

With publication of the latest storm names for use for 2024/25 due later this week, we look back at the storms of 2023/24 in what was a wet and windy autumn and winter for many in the UK.

Most named storms

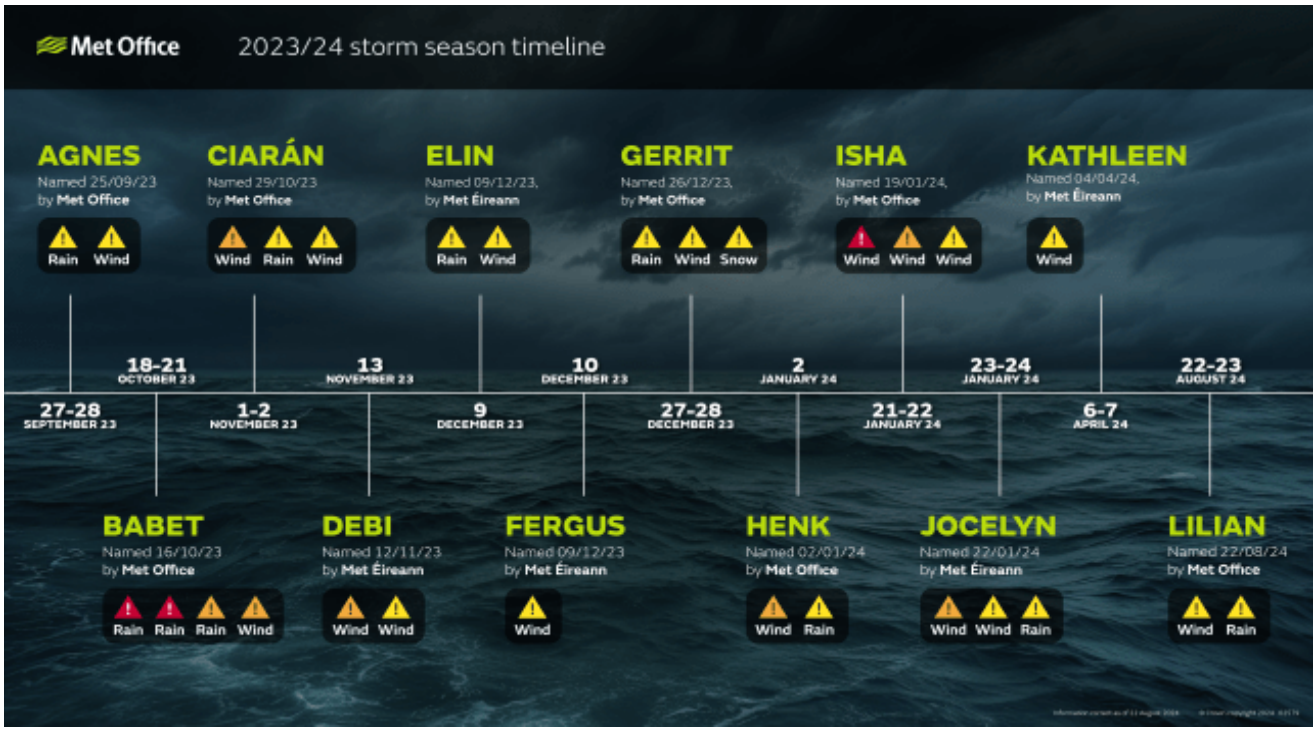
The 2023/24 storm season, which runs from 1 September 2023 through to 31 August 2024 will go down as a stormy period in most people's memories. From Storm Agnes in September 2023 through to Storm Lilian in August 2024, the UK has had its most number of named storms since the system was launched in 2015, with 12 named systems in the period.

Met Office Scientist Emily Carlisle examines the changing weather in the UK. She said: "The UK's storm season is highly variable, and minor changes in meteorological conditions are able to influence the severity of impacts we experience in the UK. This variability can even be noted in the last two years, with 12 named storms in the most recent year, but just two storms named by the group in the 2022/23 season.

"What we've observed through much of the last 12 months are frequent periods of the jet stream either being directed towards the UK or to the south of the UK. This has helped to develop and direct low pressure systems to our shores which bring us the strong winds and rain that can influence the decision to name storms."

Each named storm this season

A total of 12 storms were named in the most recent storm season by the Met Office group, which also includes Met Eireann and KNMI.



Agnes (27-28 September 2023)

The first named storm of the season was strengthened by Ex-Tropical Storm Ophelia and brought some strong winds and heavy rain. An 84mph gust at Capel Curig was the equal-highest September gust on record for Wales.

Babet (18-21 October 2023)

Babet was chiefly a rainfall event, with two red warnings for rain issued by the Met Office, with associated gusty winds. Eastern parts of Scotland had the highest rainfall totals, with 150-200mm of rain falling for many. The county of Angus had its wettest day on record, by a wide margin, on 19 October 2023 in a series from 1891.

Ciarán (1-2 November 2023)

Storm Ciarán was an exceptionally severe storm, but its path led to the worst of its impacts being felt in the Channel Islands and France. The strongest winds from Storm Ciarán were shifted to the south of the UK, with northern France and the Channel Islands having wind speeds comparable to the ‘Great Storm’ of 1987. UK wind gusts peaked at 78mph, but some stations in the north of France exceeded 100mph, and a tornado reportedly affected eastern parts of Jersey.

Debi (13 November 2023)

Named by Met Eireann, Debi had the most impacts for the Republic of Ireland, where a red weather warning was issued. For the UK, it was a notable rather than exceptional system, with some gusty winds and over 100mm of rain across upland areas of northwest England.

Elin (9 December 2023) and **Fergus** (10 December 2023)

Elin and Fergus arrived in consecutive days in December and were named by Met Eireann. They were a continuation of a wet and windy start to meteorological winter. Exposed UK coasts recorded gusts in excess of 70mph, with associated rain falling on saturated ground and causing flooding issues for many.

Gerrit (27-28 December 2023)

The post-Christmas period brought further winds and heavy rain for the UK, with Wales, northwest England and Scotland the worst affected. A peak gust of 89mph was recorded in Shetland, with wind in excess of 80mph recorded for some sites in the north and a tornado reported in Greater Manchester.

Henk (2 January 2024)

Winds and rain were again the hazards for Henk, with significant flooding issues, travel and power disruption for many. A wind gust of 81mph was recorded at Exeter Airport, but a very exposed site on the Isle of Wight recorded 94mph. Coupled with much of the southwest and south Wales receiving between 50 and 100mm of rain, these combined for an impactful start to the year’s weather.

Isha (21-22 January 2024) and **Jocelyn** (23-24 January 2024)

Isha and Jocelyn arrived in quick succession as the ninth and tenth storms of the season, chiefly influenced by a powerful jet stream. Isha was more impactful for the UK, in what was the most significant major wind storm since Eunice on 18 February 2022. Jocelyn was less severe for the UK, but brought more pronounced impacts for the Republic of Ireland.

Kathleen (6-7 April 2024)

Kathleen was an unseasonably deep area of low pressure for the time of year, bringing gusty winds for many in the north and west. Kathleen set new April gust speed records at several stations in Scotland and Northern Ireland, with travel disruption and power outages for some.

Lilian (22-23 August 2024)

Lilian in the second half of August meant that a record number of storms were named since the creation of the project in 2015. Lilian brought strong winds and heavy rain to northern England and Wales, as well as parts of Scotland, with a provisional maximum gust of 73mph.

Did storm naming help?

Storms are named to raise awareness of severe weather before it hits so everyone can stay safe. Post-storm surveys show the effectiveness of naming storms to raise awareness, with 97% of those within the amber and red warning areas for Storm Babet being aware of the warnings, and 89% of these taking action as a result.

Storms are named by Met Office, Met Eireann or KNMI when they are deemed to have the potential to

cause ‘medium’ or ‘high’ impacts in one of the countries of the group. This would typically mean when an amber or red warning is expected to be issued at some point during the event.

Have UK storms changed due to climate change?

With only the short dataset of named storms since 2015, it’s not possible to detect trends in storms at this range, so it’s important to look further into the Met Office archives.

Met Office’s Emily Carlisle explained: “The UK has a history of impactful storms stretching back hundreds of years, long before the introduction of named storms in 2015.

“One thing that is clear from observations is that there’s big variability year-to-year in the number and intensity of storms that impact the UK. In our observational records, it’s hard to detect any trend one way or the other in terms of number and intensity of low-pressure systems that cross the UK.

“While our climate overall is getting wetter, there are no compelling trends in increasing storminess in recent decades. Recent stormy seasons – such as that of 2013-2014, before the storm naming system was introduced – clearly illustrate the fundamental problem with drawing conclusions from a simple count of the number of named storms.”

Most climate projections indicate that winter windstorms will increase slightly in number and intensity over the UK as a result of climate change. However, there is medium rather than high confidence in this projection because some climate models indicate differently. Year-to-year variability in storm frequency and intensity will also continue to be a major factor in the future climate. We can be confident that the coastal impacts of windstorms, from storm surges and high waves, will worsen as the sea level rises.

Find full scientific reports for each of the season’s named storms in the Met Office’s UK Storm Centre.

Find out the latest storm names for the 2024/25 season from the Met Office on 29 August 2024.

Date Created
August 2024

When sounding the alarm feels too alarming

Description

As part of our August climate theme of climate anxiety, Emma Lawrance, Neil Jennings and Jessica Newberry Le Vay from Imperial College London have written this guest post on concerns around the psychological impact of working in climate science fields and on others in society alarmed by climate change.

> “Climate change can directly affect the emotional well-being of Earth [climate] scientists and professionals. Like the physical processes of climate change, the emotional effects are complex and multifaceted.”[1]

The unfolding climate crisis necessitates a rapid transformation of our societies. In practice, this means every career should be a ‘climate career,’ with calls in the UK for climate education to appropriately prepare children for a changing world[2]. It also means that the climate crisis should be the biggest on-going news story around.

Climate scientists have made it their life’s work to understand and predict what rising concentrations of greenhouse gases in the atmosphere mean for the climate, and what impact it will have on people and the natural world on which societies depend. They are increasingly sounding the alarm that action on

climate change is not happening fast enough, while witnessing the spread of misinformation, which can sow doubt and delay meaningful action.

At the Climate Cares Centre at Imperial College London, we hear from climate experts on the psychological toll of this work and what it can mean for their mental health. What it takes to be faced with the facts of the crisis day after day. To see the gap between the need and pace of action. And to feel the backlash from talking about the result of carbon pollution publicly[3] – from media commentators, social media trolls, and sometimes in their own personal relationships. Scientists speak of stress, anxiety, depression and burnout, all while facing a perceived need to separate their emotions from their work as a scientist[4] [5].

Widespread impacts on mental health

While climate scientists may be particularly vulnerable to the psychological toll of climate awareness, the mental health consequences of the climate crisis are widespread. As well as the range of emotions and distress that climate awareness can understandably engender, the escalating consequences of a warming world – such as extreme weather, food and water insecurity, violence, forced migration – are leading to new cases of mental health challenges and worsening existing ones (such as post-traumatic stress, depression and suicide risk). Conversely, but vitally, climate actions can have win-wins for mental health, such as from cleaner air, greener cities, better housing, more equal societies, heathier ways to eat and move around, and stronger social bonds and communities.

However, the negative consequences of climate change on mental health and wellbeing can reduce the capacity of individuals, communities and systems to be able to take climate action and achieve the necessary transformation of societies. We hear of students turning away from studying climate- and environment-related subjects or leaving climate-related careers because of a lack of support to manage the emotional and mental health impact. While there is a relative paucity of research on the topic, burnout and overwhelm among climate researchers and policymakers may hold back action and put the necessary goal of every career being a climate career at risk.

Most people around the world care about climate change, more than they think others do, and want appropriate climate action from their leaders[6] [7]. It is vital for those with the knowledge – in science, media and policy – to raise the alarm and highlight the urgent need for action. But different narratives can lead to different responses. At opposite ends of the scale, techno-optimism and fatalism/doomerism [8] are narratives that lead to present-day inaction. Both fail to acknowledge the uncertainties, nuances and complexities of the present and future, and how these make it both essential and valuable for us to act faster now. Scientists must walk a tightrope of sounding the alarm, communicating the paths to different possible futures, and helping people hold the uncertainties in ways that still catalyse action. There is much to grieve and be angry about, and much to protect and work towards – a future where the climate crisis creates a reckoning of what we really value, fight for and want to have in abundance[9] .

So how can those sounding the alarm and working to secure a liveable future be supported?

In the words of the IPCC reports, resilience requires the capacity for transformation[10]. This requires all of us living in the climate crisis, and particularly those who are already experiencing its effects and/or are working to understand and respond to them, to be supported to build psychological resilience to sustain such efforts and thrive in a changing world.

At the Climate Cares Centre, we have been working with scientists, journalists, policy experts, civil servants and students to support their mental health and wellbeing. We hear that their work has aspects that help their mental health – contributing meaningfully and connecting with others who care – and others that can cause harm – with slow progress and feelings that echo those we hear from the public, including powerlessness, hopelessness, frustration and anger.

Some of the things that we have heard from people can help:

Decision-makers need to:

- Take visible and proportionate climate action to protect and promote good mental health and wellbeing. This can reduce distress from awareness of insufficient action, help create a vision of hope for the future, and mitigate mental health impacts of climate change.
- Invest in building psychological resilience and capacity for transformation and the ability of people to sustain work in climate-related careers and actions in healthy ways, such as by integrating mental health into climate change education[11].

Organisations need to:

- Create space for and normalise climate-related emotions and distress. Everyone will have their

own psychological response that can vary over time. We heard from Met Office scientists that they found it helpful to hear “it’s ok to “feel”, and to feel multiple emotions together – it’s “possible to feel both hopeful and anxious about the future”.
- Provide opportunities for both individual and collective support within organisations e.g. ‘climate cafes’ for people to reflect and process emotional responses together, peer networks, and signposting people to resources and support.
- Divest from fossil fuels and provide clear sustainability leadership at an organisational level.
- Provide access to mental health support to ensure that psychological and mental health needs are adequately considered and supported.
- Consider how to communicate internally and externally about climate and mental health – e.g. considering the co-benefits of climate action for health.
- Provide clear institutional support and guidance for appropriate advocacy and activism efforts of staff.

Individuals can benefit from:

- Being reminded that the public cares a lot more about climate change than dominant political and media narratives can lead them to believe; “Other people care more than I think they do”; “Don’t give up. The fact that so many people are worried is a good thing and a driver for real change”; *Met Office scientists in a workshop expressing what helped them.*
- Being supported to connect with others (reflecting on emotions/experiences and taking action with colleagues, peer networks) and to spend time in nature and with loved ones.
- Support to feel comfortable engaging in advocacy and activism where they feel the need to do so.

Sources of support

Information on climate change and mental health

- Connecting Climate Minds
- Climate Cares Centre
- Briefing Paper – The impact of climate change on mental health and emotional wellbeing: current evidence and implications for policy and practice
- Animation – How does climate change affect our mental health?
- Is this how you feel?

Supporting mental health

- Climate Psychology Alliance
- Gen Dread newsletter
- Good Grief Network
- The Work that Reconnects
- Climate Cafe
- 9 things you can do for your health and the planet

Sharing stories about climate change in responsible ways

- Covering Climate Now

Footnotes

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August 2024